

**ST. CHARLES LWANGA S.S**  
**MUBENDE**

**BIOLOGY DEPARTMENT 2024**

**COMPETENCY BASED**  
**CURRICULUM QUESTION**  
**BANK**

**SECTION A ITEMS****Item 1**

The fossa is an endangered species of mammal.



- a) Explain the meaning of the term **species**. (2marks)

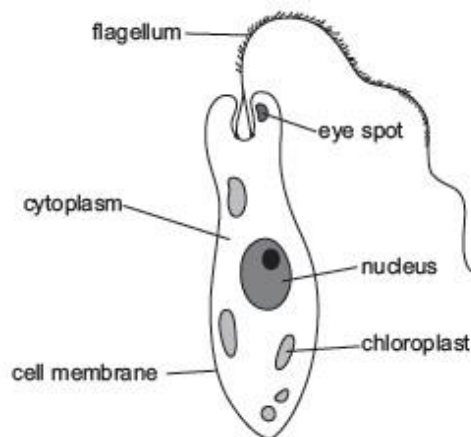
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- b) The fossa lives on an island. It is a predator. Dogs were bought to the island. The number of fossas on the island decreased.

Suggest one reason why the number of fossas decreased. (1mark)

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- c) Euglena is a single-celled organism. Look at the diagram of an euglena.



d) Explain why euglena is difficult to classify as either a plant cell or an animal cell. (02 marks)

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State four differences between a plant cell and an animal cell. (04 marks)

Plant cell	Animal cell

## Item 2

During a research conducted by microbiologists, a conclusion was made that many microorganisms are responsible for the increasing both human infections and plant diseases, of which bacteria was a major concern in their study. During the study, they grouped the bacteria, basing on both dependence of oxygen for survival and shapes of the bacteria. In their conclusion also, they clarified how bacteria are important to farmers.

(a) (i) Give a reason why bacteria are called microorganisms. (01 scores)

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(ii) State two ways how bacteria can be grouped basing on their shape. Give a reason for your answer. (02 scores)

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(b) Basing on dependence of oxygen for survival, microbiologists used a term anaerobic bacteria.

State what is meant by anaerobic bacteria. (01 scores)

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 Describe two ways how bacteria are important to farmers. (02 scores)

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(c) State any two diseases caused by bacteria in animals. (02marks)

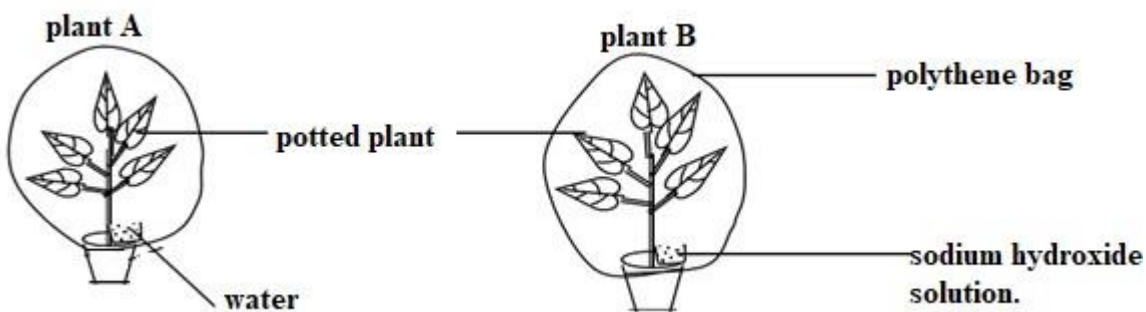
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(d) How do ruminant animals depend on bacteria for digestion? (02 scores)

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### Item 3

During an investigation of both the factors that affect the rate of photosynthesis and whether starch is formed during photosynthesis by S.2 students of SENK, two potted plants A and B were used and the plants were first kept in darkness for two hours, then after a leaf was detached and tested for starch. After the two days, the students then carried the two potted plants and placed them in direct sunlight for three hours after which tested for starch from each plant again. Study the two setups below carefully and answer the questions that follow.



(a) (i) Give a reason why the potted plants were kept in darkness for two days. (01mark)

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(ii) State the role of sodium hydroxide in potted plant B in relation to the factor under investigation. (01 scores)

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 (b) During the test for starch, learners;

- Removed a leaf from the two potted plant both before and after exposing the plants to sunlight and then placed them separately in boiling water for 5 minutes.
- Then separately placed the leaves in a beaker containing alcohol and boiled using a water bath. The leaves were then washed in hot water.
- After which leaves were spread on a white surface tile and drops of iodine added on each leaf.

State what was observed with the leaf;

(i) Used before placing the potted plants in direct sunlight. (01 score)

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(ii) From potted plant A after placing the plants in direct sunlight. (01 score)

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(iii) From potted plant B after placing the plants in direct sunlight. (01 score)

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(c) Explain the significance of the following during the experiment.

(i) Spreading the leaves on a white surface tile before adding drops of iodine. (01 score)

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(ii) Addition of iodine solution drops to leaves in the above experiment. (01mark)

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(iii) Leaves were placed in boiling water for 5 minutes. (01mark)

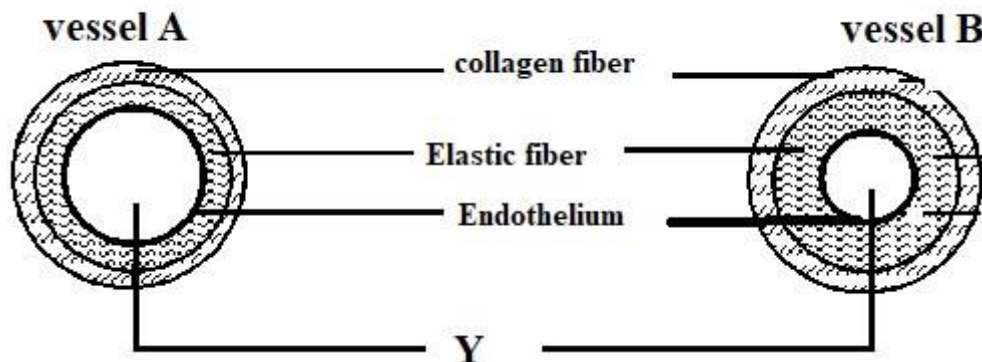
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 (iv) Leaves were boiled in alcohol.

(01mark)

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 (d) State any two other factors that affect the rate of photosynthesis. (01mark)

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**Item 4**

Dr. Nambasi when addressing the nation about the different diseases that affect human circulatory system, he said, 'circulatory system consists of the pumping organ, circulating fluid and the channels/tube-like structures. He used the vessels below A and B in differentiating the categories of channels through which a circulating fluid. Use the following vessels and attempt the following questions.



(a) (i) Which organ in the body did Dr. Nambasi refer to as the pumping organ?  
 (01mark)

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 (ii) Identify which channel of the circulatory system is vessel A. Give a reason for your answer. (02 scores)

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 (b) (i) State two structural differences between vessel A and vessel B. (02 scores)

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(ii) Describe how the structural differences given above are significant in the functioning of vessels. (04 scores)

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(c) State one function of a circulating fluid in the circulatory system. (01 scores)

### Item 5

During a research study by World Health Organization, after covid 19 pandemic periods about physical activity, eating disorders and body mass index (BMI) among university students, it was discovered that there is a sharp increase in eating disorders among university students since covid 19 pandemic, among which emphasis was on bulimia and anorexia.

(a) Describe any two causes of increasing eating disorders among university students. (02 scores)

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(b) Distinguish between bulimia and anorexia as identified among students. (03 scores)

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(c) In an attempt to get body mass index of students, John and Tom were used in the study. When the body measurements of Tom and John were taken at the

university, John had 60kgs and height of 1.5m while Tom had 40kgs and height of 1.7m.

- (i) State the significance of taking body mass index. (01 scores)

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- (ii) Determine the body mass index of the two students, Tom and John. Give a comment on the body mass index of the two university students. (03 scores)

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- (d) State any two risks/ dangers of overweight. (02marks)

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### Item 6

Tobi amusan an athlete in Africa, during her interview after winning the Olympics medal 2022, she narrated how her life journey started and why she was grateful for the great achievement. In the story, she experienced many challenges in the start of the hobby, where she could experience muscle cramps during running and also she could breathe faster and deeply and faster just after running. When asked on which things she could eat before a run, only glucose and water she replied. Study the race in picture below and attempt the following questions.





(a) Describe how respiration was a key factor in the victory of Tobi amusan.  
(03marks)

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(b) During running, both aerobic and anaerobic respiration occurs; Tobi amusan claimed.

(i) State why anaerobic respiration during running. (02marks)

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(ii) State three differences between aerobic and anaerobic respiration during running. (03marks)

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(c) Explain why Tobi amusan could

(i) Suffer from muscle cramps during faster running. (02marks)

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(ii) Breathe faster and deeply after running. (02marks)

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(d) Give a reason why athletes are given glucose than eating food five minutes to the start of the race. (02marks)

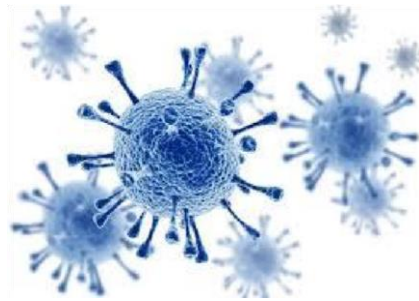
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### Item 7

(a) AIDS is a viral disease that has claimed many lives of people worldwide. It is carried by a retrovirus, that is small, very infectious and possess features for both living and nonliving things.



### Task

State reasons why viruses are considered to be;

- (i) Living things (01 score)

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- (ii) Nonliving things (01 score)

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- (iii) How can Senior 3 students prevent themselves from being infected with AIDS? (02 scores)

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(b) Cassava plant, *Manihot esculenta* produces root tuber, which is the major source of fiber and carbohydrates in many families in Uganda. During a research study in Kikubajinja village, it was noted that the major cause of low cassava productivity is infection with a viral disease, Cassava mosaic that causes twisting of leaflets reducing leaf area exposed to light and amount of food manufactured by the plant.

### Task

Describe how cassava mosaic is spread and suggest the ways farmers in the village can prevent its spread and effects

(06 scores)

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**Item 8**

(a) Atieng and Deng, senior two students were touring their school garden. They came across the maize plantations intercropped with soya beans. Each of them uprooted a soya bean and a maize plant and were arguing as to whether the plants are either monocots or dicots

**Task**

As a biology student, how would you help them settle their argument with clear reasons? **(04 scores)**

During one of the biology lessons, the teacher discussed with learners about modifications of leaves of flowering plants. However, Moses did not attend that lesson due to sickness and would like to seek your help.

**Task**

With examples, help Moses describe the different modifications of leaves of flowering plants.

(06 scores)

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### Item 9

(a) Insects are diverse and play several vital roles in the life of other organisms. They share several structural features on their bodies some of which have made them to be the most successful organisms on Planet Earth

#### Task

- (i) Identify any four vital roles insects play in the life of other living organisms (04 scores)

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- (ii) State one way of controlling harmful effects of insects (01 score)

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- (iii) James was given insects specimens A, B, C and D for a practical session and he was able to record the following observable features but he could not make a dichotomous key.

Specimen	Antennae	Mouthparts	wings	legs
A	Long	Mandibles	none	Short

B	Long	Proboscis	Has 2	Short
C	Short	Proboscis	none	Long
D	Short	Proboscis	Has 4	Long

Using the features from the table, help James construct a dichotomous key to identify the insect specimens A, B, C and D **(05 scores)**

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### Item 10

Joseph was suspended from school as a result of drinking alcohol. He engages in heavy drinking of alcohol in the nearby trading centre. One day, as John approached a swamp on his way home staggering from drinking alcohol at 5:00 pm, he encountered a snake. His heart started beating faster and his breathing rate increased. He tried to pick a nearby stick but he could not get hold of it on several attempts, so the snake escaped.



FIG.2 shows Joseph walking home from drinking alcohol.

#### Task

- Describe how Joseph's body coordinated to bring about his reactions from the time he encountered the snake up to when his rate of breathing increased.

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b. What are the likely effects of John's lifestyle as described in the scenario?

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### Item 11

In animals, glucose is broken down to produce energy in body cells liberating carbon dioxide, water and energy(ATP) in presence of oxygen while carbon dioxide and lactic acid are produced in limited supply of oxygen /no oxygen

The lactic acid produced accumulates in blood until when it's oxidized/broken down later during oxygen debt

A group of ATHLETES were performing an exercise, they started by warming up and later vigorous running/sprinting then after rested.

SUPPORT



### Item 12

James is a senior one student who likes studying about plants. One day as he was studying his plant he identified a plant with the leaf as shown in figure 1 below and decided to bring the part of the plant with the leaf to you for identification



a) Describe how you are going to help James and explain to him why the plant is having such a structure. (04 scores)

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b) Figure 2 below shows a goat being tired by the owner. Whenever it's becoming dark late in the evening the goat begins to make sounds and also when it's around 11 am in the morning.



Identify the life processes exhibited by the goat and describe how important the life processes are to the goat. (04 Scores)

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**Item 13**

S.2 class of Apesco made a model a cell as one of their projects assigned by their teacher. The figure 3 below is what they have come up with as their final product.



- a) Giving reasons state the type of the cell these students have modeled

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- b) Describe how this model of the cell is different from other cell types.

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 .....(Score 04)

#### Item 14

In one of the biology lessons, Mr. James told the students that in classifying living organisms, each organism has scientific names or the botanical names for example he said that the botanical name of honey bee is *Apis mellifera*. Your friend Jane did not understand that concept very well and has come to ask for your help to explain. Explain to her how the teacher has come up with the scientific name of honey bee.

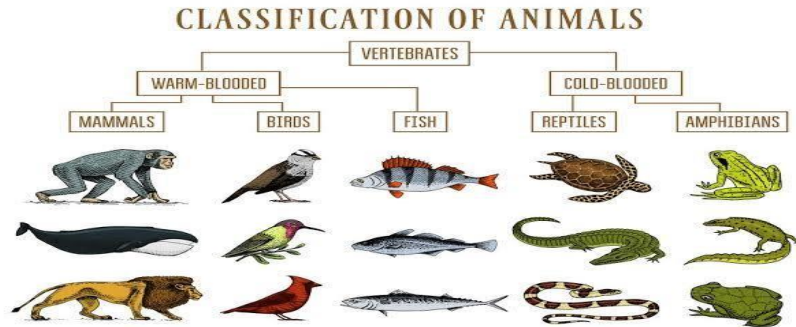
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(Score 04)

#### Item 15

The new senior one students of your school are having their orientation and the head teacher has directed you to take them out to tour their classrooms. In one stream of S.1 Y the students discovered a chart showing the diversity of living organisms and have asked you on how the organisms are placed in their different groups. Below is the chart found in their classroom?





Describe how you are going to help these students

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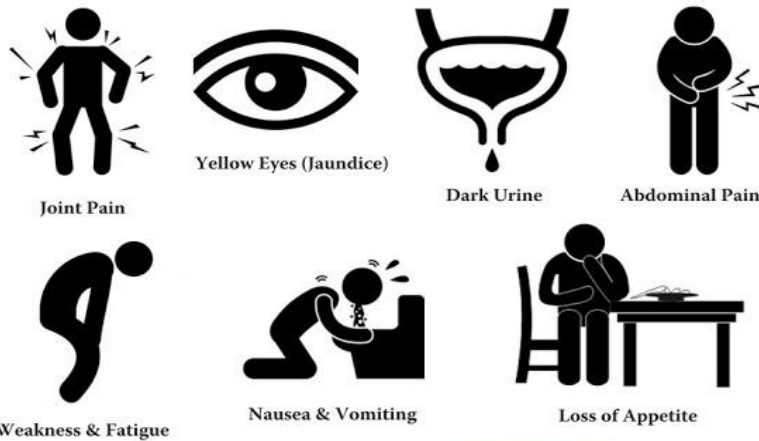
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(Score 04)

**Item 16**

There is an outbreak of a rare disease in Komendako village in Terego with the following signs and symptoms; abdominal pain, passing of dark urine, fever, joint pain, Nausea and vomiting, yellowing of skin and eyes (jaundice) and loss of appetite.



You have being conducted about the possible cause of this disease. Briefly explain to them what this disease is and how it's got and spread from one person to another.

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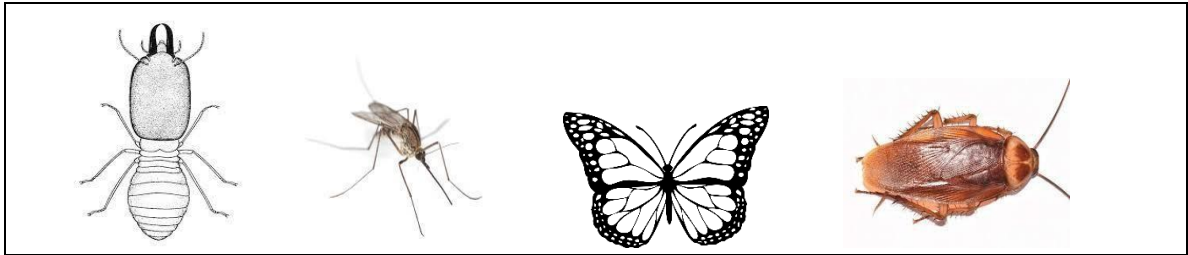
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(Score 04)

**Item 17**

The biology class was asked to collect a number of organisms for their next lesson among which the teacher said should collect the following. Butterflies, cockroach, mosquitoes and soldier termites.



Construct a dichotomous key that can be used to identify these organisms

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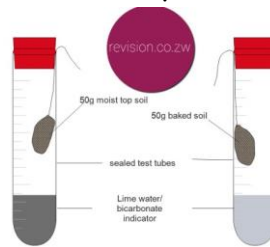
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(Score 04)

### Item 18

The figure below shows the result of experiment carried out by the S.2 about soil components. Study it carefully and answer the questions that follow.



Identify the component of the soil these students were investigating and state the importance of the component under investigation.

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(Score 04)

### Item 19

In your village many children seemed to be malnourished with so many signs and symptoms as shown below.



Describe the nutritional deficiency disease these children are suffering from and suggest possible solutions for this disease.

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(Score 04)

### Item 20

Cells are said to be the basic unit of life in which materials move in and out. The figure below shows one of the processes responsible for the movement of these materials into and out of the cells.



Explain why the materials move into and out of the cells.

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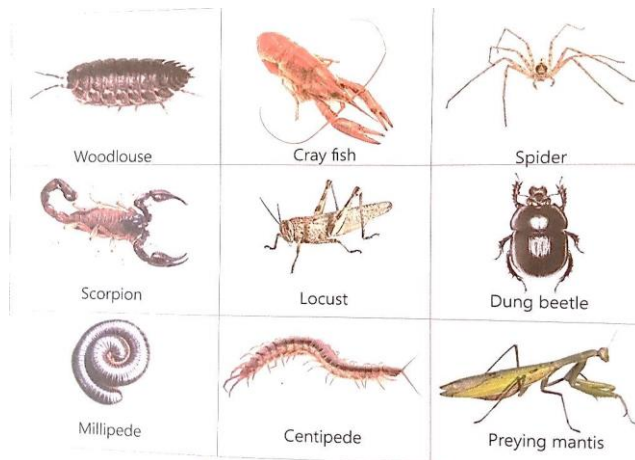
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(Score 04)

**Item 21**

While studying about the different organisms belonging to different kingdoms, a biology teacher displayed a chart in class showing organisms belonging to kingdom Animalia. Use the chart below to generate information to answer the questions that follow.



- a) i) As a student who understood the different phyla in kingdom Animalia, state the phylum to which the above organisms belong. Give one reason to support your answer. (02 marks)

b) Phylum: .....

Reason: .....

- iii) From the chart above, state the organisms that belong to the following classes (05 marks)

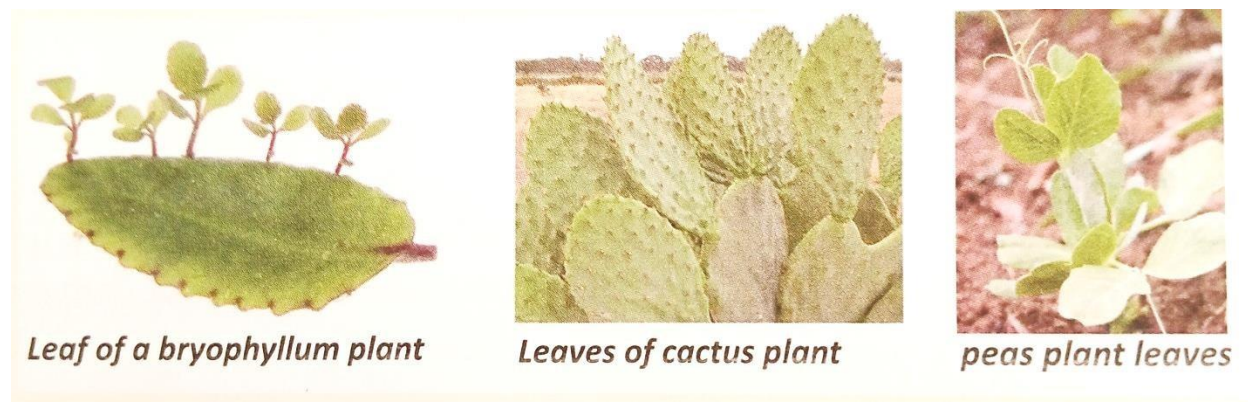
Class	Organisms
Arachnida	
Chilopoda	
Insecta	
Diplopoda	
Crustacea	

- b) State the economic importance of insects to man (03 marks)

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**Item 22**

a) A farmer cultivated a variety of crops in his garden. After two months, he observed the leaves of some plants and he noticed that the plant leaves had some unique modifications as compared to the rest of the plants as shown below.



*Leaf of a bryophyllum plant*

*Leaves of cactus plant*

*peas plant leaves*

i) Based on the knowledge you acquired about modified plant structures, briefly explain what you understand by modified plant leaves. (02 marks)

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ii) If the farmer interviewed you to assist him understand how the above plant leaves are modified to perform their specific functions, explain to him the modifications on each of the plant leaves above that suit them to perform specific functions. (06 marks)

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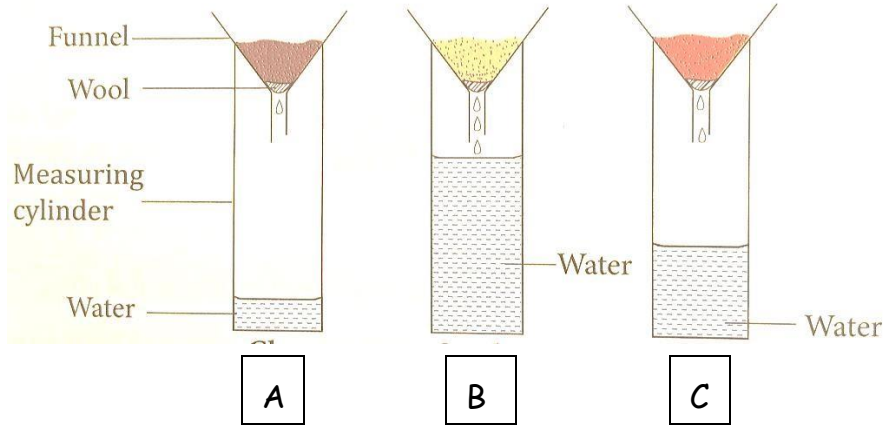
c) Most plant leaves are adapted to carrying out photosynthesis. Outline any two structural adaptations of plant leaves to carrying out photosynthesis.

d) (02 marks)

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**Item 23**

a) A group of S.2 students conducted an experiment on soil involving three soil samples A, B and C to determine certain properties of the soil. They set up an experiment in the laboratory as shown below.



i) As a student who has conducted experiments on soil to determine the various properties of the different soil samples in your school, suggest the aim of the above experiment. (01 mark)

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ii) From the results of the experiment above, state the type of each soil sample A, B and C. Give one reason to support your answer. (06 marks)

Soil sample A .....

Reason.....

Soil sample B.....

Reason .....

Soil sample C.....

Reason.....

e) Explain the following observations

i) Sandy soils may not be the best soil for crop cultivation (01 mark)

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ii) Mineral nutrients that occur deep in the soil can reach plant roots (01 mark)

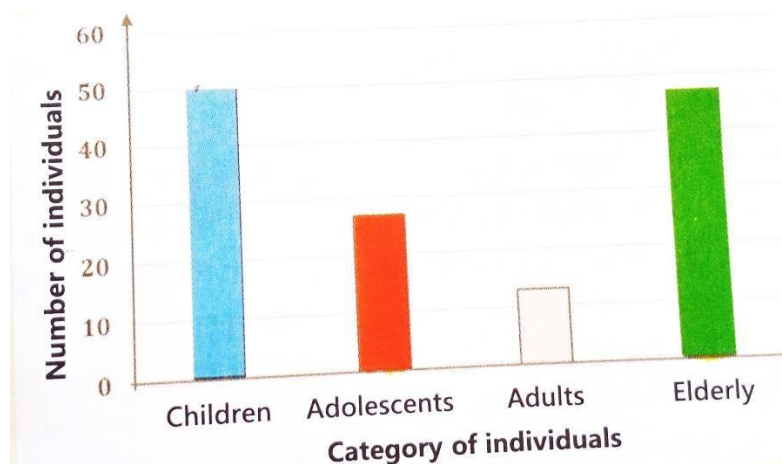
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f) What would be the effect of too much water in the soil (01 mark)

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### Item 24

The ministry of health assigned Adong and Mugabe to conduct a survey about tooth decay cases in a certain district. They carried out the survey successfully and obtained results which are shown in the figure below.



a) From the figure above, state the category of individuals that had;

i) The most cases of tooth decay and why? (02 marks)

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ii) The least cases of tooth decay and why? (02 marks)

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 .....

b) You have been asked to educate the above categories of people on how they can prevent their teeth from continuing to decay. Which piece of information/advice would you offer to them? (02 marks)

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c) Your brother in P.7 has asked you to help him understand the functions played by the different types of teeth in a human being. Using your knowledge of nutrition

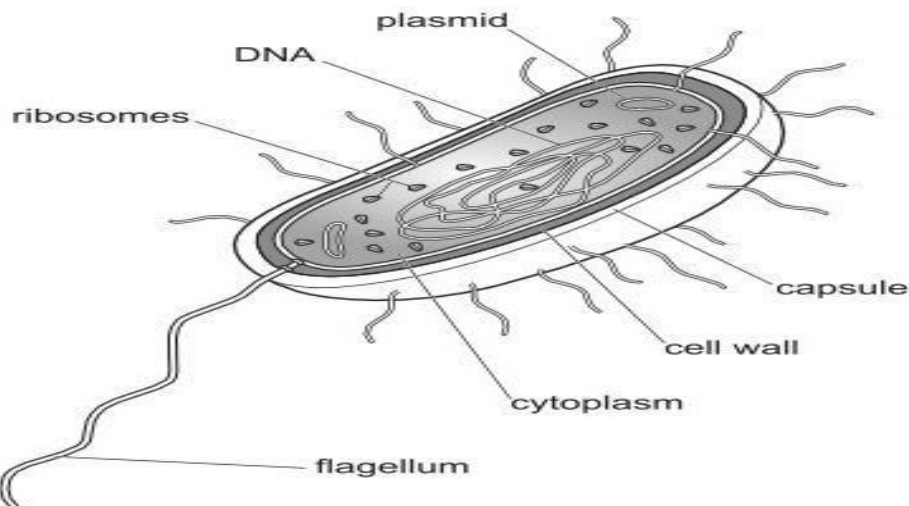


in mammals, help your brother to match the types of teeth with their respective functions shown below. (04 marks)

Type of teeth	Function
Molar	Piercing and tearing
Canine	Biting
Incisor	Cutting flesh
Carnassial	Chewing and grinding

### Item 25

The diagram is of *Vibrio cholera*, the bacterium that cause cholera.



(a) Describe two similarities and two differences between a palisade mesophyll cell and the bacterium cell. (04marks)

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(b) State two features of bacteria. (02marks)



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(c) Describe two roles played by bacteria in your community (04marks)

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### Item 26

a) Alcohol can be made from the Micro-organism yeast

i) Write a balanced equation for production of alcohol by yeast.

(01marks)

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ii) Name the organ that breaks down alcohol in the human body. (01marks)

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iii) Describe how alcohol is made by yeast.

(03marks)

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b) During a study using a computer model it was shown that the alcohol dehydrogenase which breaks down alcohol has a specific fixed shape.

Explain why a fixed shape of an enzyme is important. (03marks)

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c) The table below shows the enzyme activity of alcohol dehydrogenase at different temperatures.

Temperature / °C	Enzyme activity
30	115
42	175

i) Explain why an increase in temperature causes an increase in enzyme activity. (03marks)

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ii) State two factors, other than temperature that affects enzyme activity. (02marks)

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### Item 27

Coronary heart diseases are on the rise as shown by recent surveys and one of its possible causes is too much fat in diet.

(a) Describe how too much fat may cause coronary heart disease. (03marks)

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(b) Describe and explain how coronary heart diseases can be treated.

(05 scores)

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(c) State two effects of coronary heart diseases.

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**Item 28**

The teeth are special structures which aid in digestion

(a) Describe the role of teeth in digestion food digestion. (03marks)

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(b) Explain the consequences of poor dental hygiene. (03marks)

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(c) State the ways of keeping our teeth healthy. (02marks)

**Item 29**

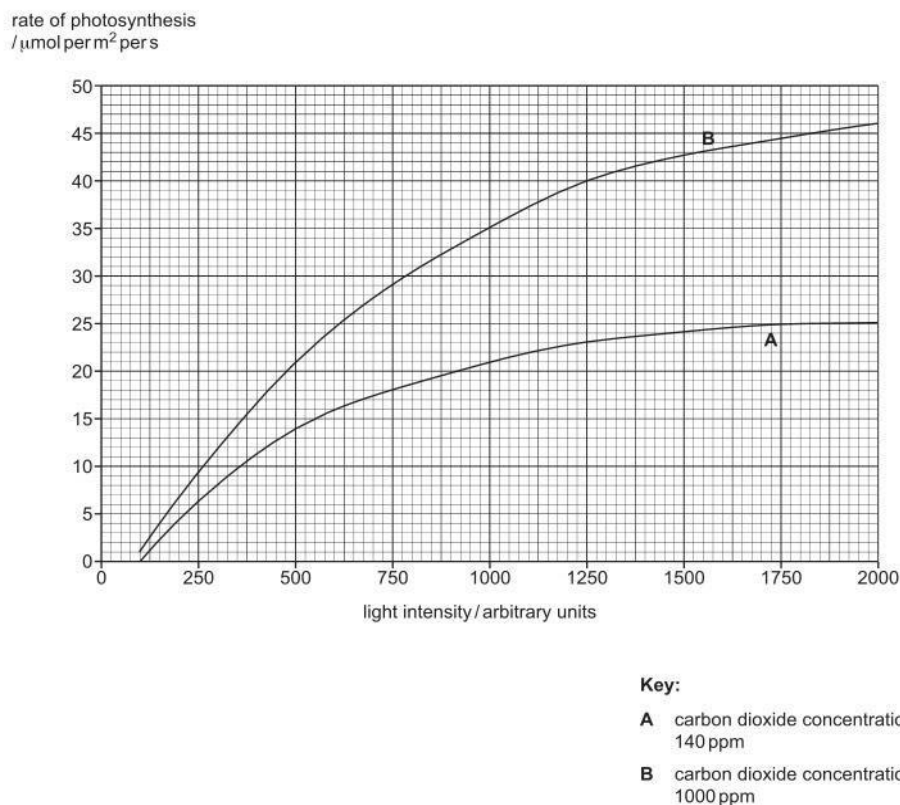
a) Write the word equation for photosynthesis. (02marks)

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(b) Scientists investigated the effects of light intensity on the rate of photosynthesis in the leaves of the eucalyptus trees at two different concentrations of carbon dioxide



(i) Suggest and explain why scientists kept the temperature of leaves at 20 while they recorded the results. (02marks)

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(ii) Calculate the percentage increase in the rate of photosynthesis at light intensity 1250 arbitrary units when carbon dioxide was increased from 140ppm to 1000ppm. (02marks)

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(iii) Explain the reasons for the increase in (ii). (02marks)

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(iv) Describe the effects of increasing light intensity on the rate of photosynthesis when carbon dioxide concentration was 140ppm.

### Item 30

a) Using two cubes of different sizes, explain to your brother in primary seven that multicellular organisms need specialised gaseous exchange.

(05marks)

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(b) Explain the effects of smoke of cigarrates on the gaseous exchange surfaces in lungs. (03marks)

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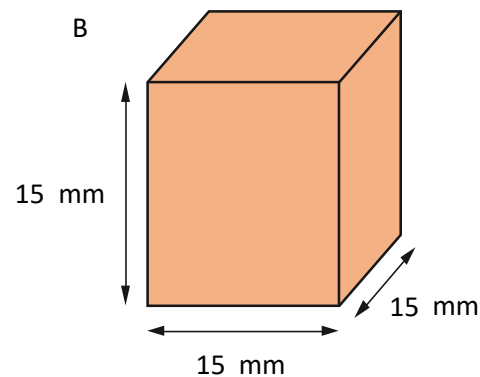
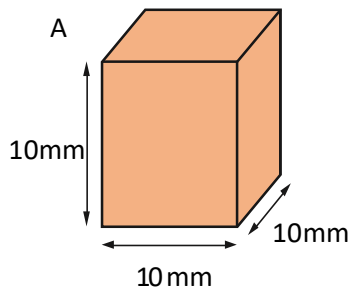
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### Item 30

The diagrams below represent the bodies of two mammals rat A and elephant B.



a) Biologically using the surface area/volume ratio concept, state which mammal suitably requires a transport system. (7 marks)

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b) Describe the role of the lymphatic system in the human body. (3marks)

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### Item 31

(a) Complete the table below by filling the missing gaps. (02 marks)

Insect	Harmful stage	Useful Stage
Termite		Adult
Housefly	Adult	
Mosquito		Larva
Butterfly	Larva	

b) Describe three ways how the harmful stages of **mosquitos** and **termites** can be controlled. (06 marks)

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c) Explain how the named stages of butterfly and termites are of economic importance. (02 marks)

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### Item 32

Study the pictures below and use them to answer the questions that follow.



(a) Which body system consists of what is given in picture above? (1mk)

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(b) How is that system important in the body according to illustration in picture above? (3mks)

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(c) Describe how the system above and associated structures are essential in the breathing process. (6mks)

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**Item 33**

During a research study by a group of physiologists, it was discovered that certain materials can enter or exit cells. The entry or exit of these materials was found to be under the control of the cell membrane. They also discovered that these materials enter or leave the cells by certain processes which they noted in their research report.



(a) (i) Explain how the cell membrane controls entry and exit of materials into or out of the cell. (02marks)

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(ii) State why it's important for movement of materials in and out of cells. (03marks)

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(b) Apart from diffusion, name any other two processes by which material enter or exit cells. (01mark)

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(c) Describe how the following factors affect the process of diffusion.

(i) Temperature (02marks)

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(ii) Concentration gradient. (02marks)

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### Item 34

a) Botanists and zoologists claim that plants and animals depend on each other. Zoologists noted that animals depend on food made by plants but botanists did not explain how plants depend on animals. As a senior four student; explain briefly how;

(i) Plants obtain energy for making their own food. (02marks)

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(ii) Plants depend on animals for their survival.

(02marks)

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(b) Apart from the food which animals obtain from plants, describe different ways how the process by which plants make their own food is important in nature.

(04marks)

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(c) State how animals obtain energy from plants.

(02marks)

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### Item 35

Mr. Mudondo a tomato farmer is always seen covering the garden of his tomatoes with dry spear grass. His crops appear green in the dry season.

a) Explain why his crops are healthy and green even during dry season. (06 marks)

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- b) Besides covering the garden of tomatoes with dry grass, in which other ways would Mr. Mudondo ensure his crops are ever green and healthy in the dry season (04 marks)

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### Item 36

During a research study by a group of physiologists, it was discovered that certain materials can enter or exit cells. The entry or exit of these materials was found to be under the control of the cell membrane. They also discovered that these materials enter or leave the cells by certain processes which they noted in their research report.

- (a) (i) Explain how the cell membrane controls entry and exit of materials into or out of the cell. (02marks)

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- (ii) State why it's important for movement of materials in and out of cells. (03marks)

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- (b) Apart from diffusion, name any other two processes by which material enter or exit cells. (01mark)

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- (c) Describe how the following factors affect the process of diffusion.

- (i) Temperature (02marks)

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(ii) Concentration gradient. (02marks)

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**Item 37**

a) Botanists and zoologists claim that plants and animals depend on each other.

Zoologists noted that animals depend on food made by plants but botanists did not explain how plants depend on animals. As a senior four student; explain briefly how;

(i) Plants obtain energy for making their own food. (02marks)

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(ii) Plants depend on animals for their survival.

(02marks)

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(b) Apart from the food which animals obtain from plants, describe different ways how the process by which plants make their own food is important in nature.

(04marks)

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(c) State how animals obtain energy from plants.

(02marks)

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### Item 38

Mr. Mudondo a tomato farmer is always seen covering the garden of his tomatoes with dry spear grass. His crops appear green in the dry season.

c) Explain why his crops are healthy and green even during dry season. (06 marks)

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d) Besides covering the garden of tomatoes with dry grass, in which other ways would Mr. Mudondo ensure his crops are ever green and healthy in the dry season. (04 marks)

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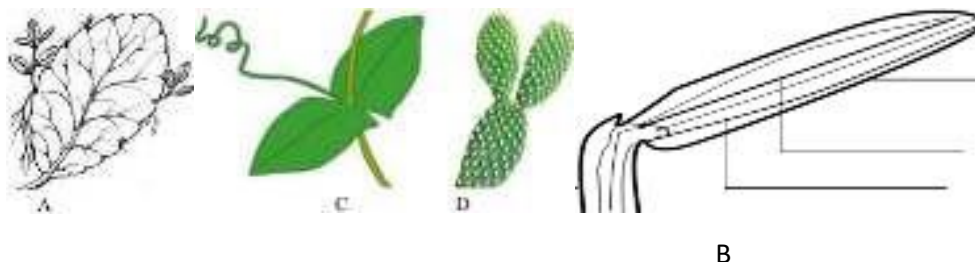
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### Item 39

The figure below shows similar plant organs which were obtained from different plants.



- a) Giving two reasons, identify the plant organs shown in the figure above. ( 3 marks)

Identify	Reasons

- b) State the class of the plant from which organ B was obtained, give two reasons for your answer. ( 3 marks)

Class	Reasons

- c) Using any observable features, construct a dichotomous key to identify the organs A, B, C and D. ( 4 marks)

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### Item 39

During leisure time on Sunday, students at **ST. CHARLES LWANGA SS** watch programs on national geographic wild channel. One day, they watched a lion chasing a giraffe. Moses, a senior one student was very much excited. The lion took only three minutes to capture the giraffe. As a biology student;

- a. With reasons, name any five life processes that were expressed in the above scenario by the organisms. ( 10 marks)

Life process	Reason

#### Item 40

When a bread is kept for a long period of time, some structures known as mould begin developing in the surfaces of the bread.



- b. Identify the kingdom to which they belong. ( 1 mark)

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 c. State any three other organisms belonging to the same kingdom. ( 3 marks)

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d. State any four characteristics of organisms in the kingdom. ( 2 marks)

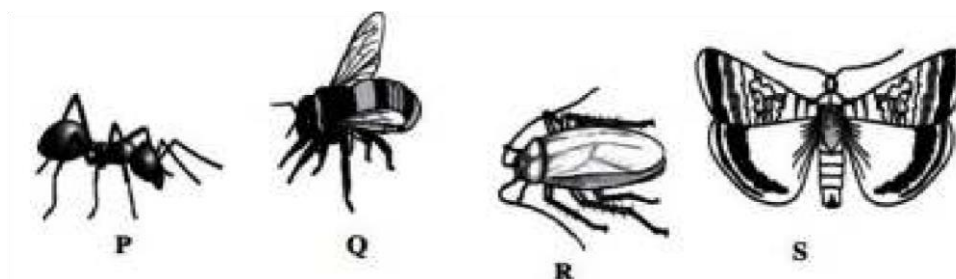
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e. Giving examples in each case, suggest any four economic importance of organisms in the above kingdom. ( 4 marks)

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**Item 41**

Arthropods are very vital living things in nature. Below are some pictures of common arthropods in our environment.



a. Giving reasons, identify the class of animal R. ( 4 marks)

Class	Reasons




b. State any two ways in which animal P is different from animal R. ( 2 marks)

Animal P	Animal R

c. Using observable features on the drawings above construct a dichotomous key for the arthropods. ( 4 marks)

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### **Item 42**

In Karamoja, their landscape is flat and the inhabitants for long have been cattle keeping as shown below this has caused severe cases of reduced crop production.



Explain how this practice causes the low crop yields in these regions.

(05scores)

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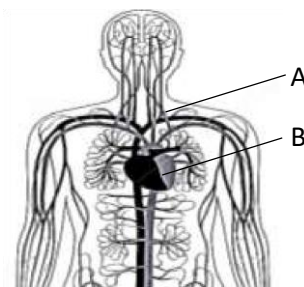
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**Item 43**

When asked to include the body systems that occur in humans. Many students of S.3 gave different systems including the one shown below. This system is however attacked by diseases also shown aside.



a) Describe how the above structures labelled on the diagram work together to enhance the activity of the above system. (03scores)

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- b) By identifying the disease shown and its vectors, state how the functioning of the system, is impaired.  
(02scores)

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#### **Item 44**

On clear observation, sandy soil is described to be grey in colour and rough textured. Explain how these two properties provide information about the fertility of this types of soil. (05scores)

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#### **Item 45**

The information was obtained from two regions in which one has tarmac road and the other marram road on a sunny day and many vehicles were using the roads.

Organism	Distribution of organisms	
	Marram road	Tarmac road
Lantana plants	1000	2080
Rodents	93	1900

Explain the distribution of organisms in the regions. (05scores)

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#### **Item 46**

Many reports have been given about the exhaustion of Mabira forest and there have been severe cases of harmful results following many years of this act. Explain the likely effects of this phenomenon to the existing organisms and climate.  
(05scores)

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**Item 47**

In swamps during rainy seasons, many toads are normally observed engaging in the following behavior. Study the figure below carefully and use it to answer questions that follow. By stating the life process shown in the diagram, describe how it differs and disadvantageous to that undergone by human beings. (05scores)



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**Item 48**

During Inter-house competitions, many learners were observed to be releasing a lot of water through sweating, however very few students were registered losing water via urinating at the same time.

a) Why is this so? (02scores)

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b) Explain the significance of sweating to a human being. (03scores)

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**Item 49**

When an S.4 stocked a half-sac of Irish potatoes to be consumed after school, after a few weeks, he found he Irish potatoes under the sac developed buds and made a loss.



- a) What enables the Irish potatoes to germinate?  
(02scores)

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- b) How does this scenario teach you about the storage of Irish potatoes in homes and why? (03scores)

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**Item 50**

When a person breathes in, the rib cage and diaphragm change accordingly and lungs expand to occupy almost the entire thoracic volume

- a) Describe the significance of these changes in the ribcage and diaphragm.  
(03scores)

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- b) How is the expansion of the lungs important during inspiration? (02scores)

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**Item 51**

In the brain, there is the cerebrum and cerebellum, which perform different functions in the body of man.

Alcohol affects cerebellum, in the way that it does not affect vision and hearing of the person. Explain how this suggests the function of these two parts of the brain.  
(05scores)

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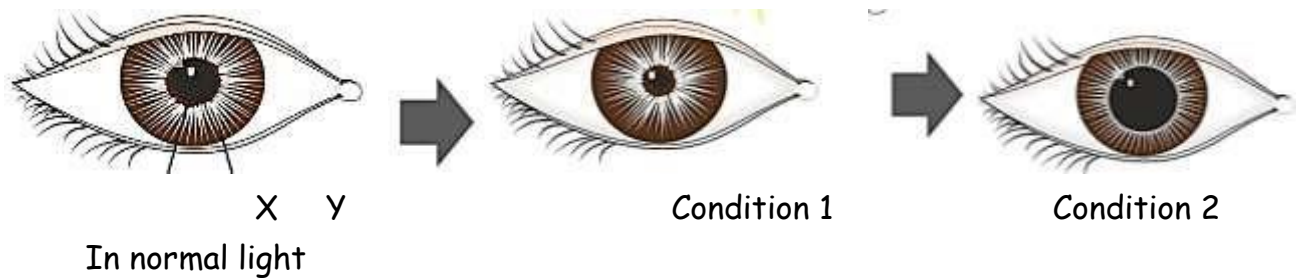
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### **Item 52**

The eye of an S.4 was analyzed in two different intensities of light and the following results were obtained.



By naming structures X and Y, and identifying the conditions 1 and 2, in to which the student was exposed, describe their role in protecting the retina.

(05scores)

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### **Item 53**

An S.4 student planted a mango tree at home. The tree developed and started providing fruits to the student. However, the tree provided fruits at even the old age of the student.

- a) Explain how this describe the difference in the development of the mango tree and a student. (02scores)

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- b) How is development of plants economically significance to the economic survival of man. (03scores)

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#### **Item 54**

In early 20<sup>th</sup> century, many reports of endocrine disorders were registered in countries that were not using iodized salt. This causes the disorders as this shown below.



- a) Name the disease and explain the role of iodized salt in the eradication of this disorder.

(03scores)

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- b) How does this disorder affect the victim? (02scores)

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#### **Item 56**

When a person lacks enough calcium in the body, challenges in his overall process of locomotion and movement of joints may arise if not diagnosed.

a) Explain the role of calcium in relation to the process of locomotion. (02scores)

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c) Suggest ways how a person can avoid the effects of locomotory inabilities. (03scores)

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### **Item 57**

In physics, energy is defined as the ability to o work. By describing the source of energy, explain the above statement in relations to biology, basing on human beings. (05scores)

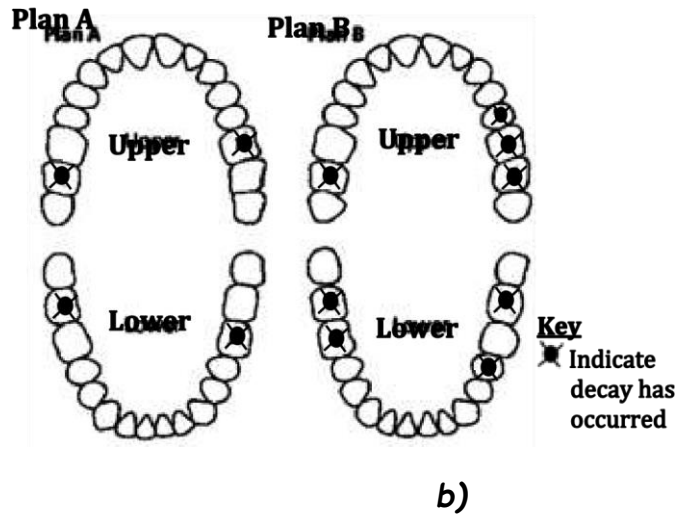
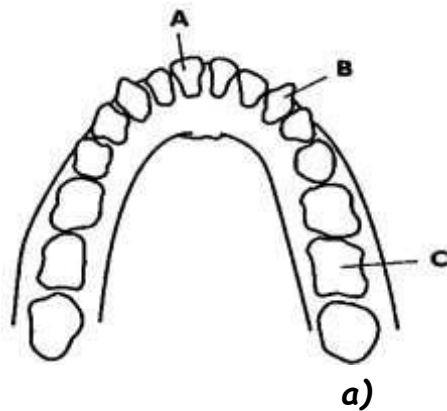
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### **Item 58**

The diagram in *fig.1 a)* shows the teeth in the upper jaw of a human. *Fig.1 b)* shows plans of the teeth in the upper and lower jaw. Plan A is from a 27-year-old woman called Hannah; plan B is from a 27-year-old woman called Hope. The two women live in different towns. In one town the natural drinking water contains fluoride salts, but there are no fluoride salts in the drinking water of the other. Use it to answer questions that follow

*Fig.1 .*





a) Name the teeth labelled A, B and C and state the function of each tooth. [03marks]

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b) Calculate the total number of teeth that are present in the mouth of organism with dentition in fig.1 a) [02marks]

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(i) Which woman lives in the town with fluoride in the drinking water? Support your answer with numerical data. [02marks]

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(ii) Suggest other reasons for the difference in the number of decayed teeth in the two. [02marks]

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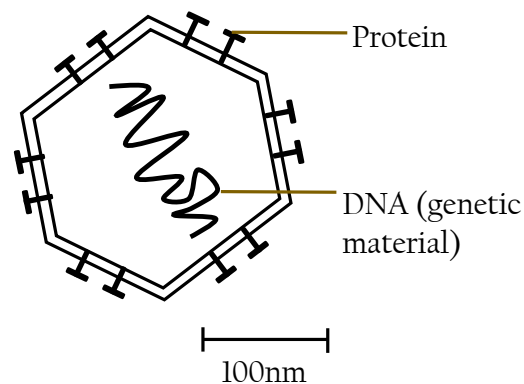
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(iii) Explain why decay is more likely in the cheek teeth. [01mark]

**Item 59**

The diagram shows a virus. Study it carefully and use it to answer questions that follow.



- a) With reference to the diagram and your own knowledge, discuss whether or not viruses can be considered to be living organisms. [03marks]

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- b) 1nm (nanometer) is  $10^{-9}$  m. Measure the length of the scale bar. Use this, and the label on the scale bar, to calculate the magnification of the diagram. Show your working. [02marks]

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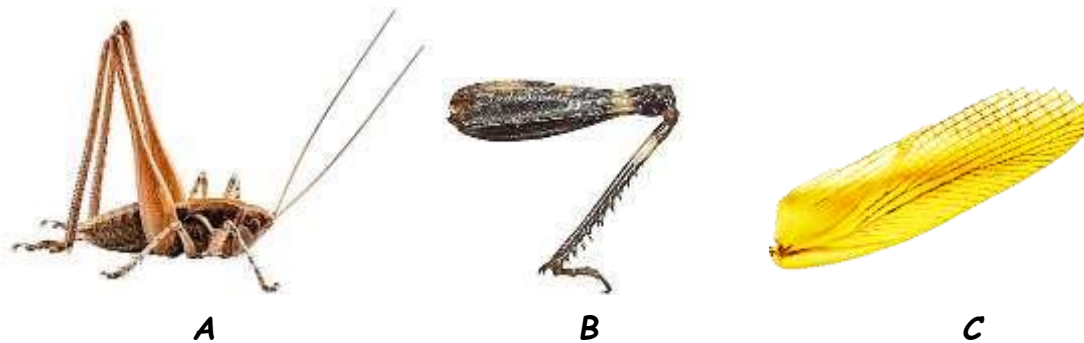
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**Item 60**

In the figure below, pictures of an insect, A, insects leg B and the wing of the insect, C. Use them to answer questions that follow.



- a) State the structural and functional differences of B and C. [03marks]

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- b) Explain the attachment of B on the body of various insects. [02marks]

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- c) Give reasons why A is an insect. [03marks]

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- d) State the structural adaptation that suit B to its function. [02marks]

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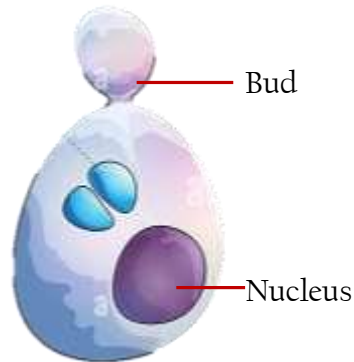
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### Item 61

- a) Explain why euglena can be classified as a plant as well as an animal.[02marks]

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b) The figure below shows a *sugar fungus*. Use it to answer questions that follow.



(i) Identify the organism and explain its characteristics with the help of the diagram. [02marks]

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(ii) How does it differ from other members in the same kingdom? [02marks]

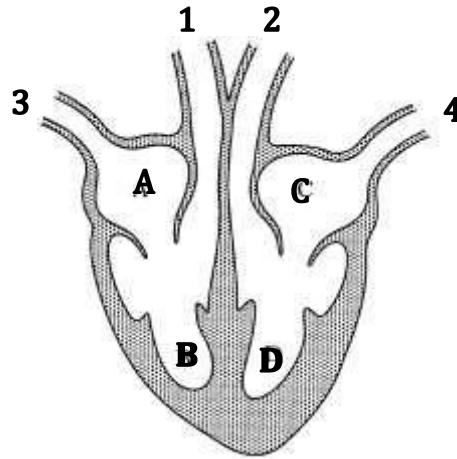
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(iii) Examine the distribution of this organism and its relevance to man in his daily life. [05marks]

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### Item 62

The diagram below shows blood vessels and chambers of the heart.



- a) Draw arrows to show the direction of blood flow in the heart hence state the order of the chambers through which blood flows. [02marks]
- b) (i) The blood in vein 4 has the highest oxygen concentration. Explain why. [02marks]

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- (ii) From the diagram above, state the number of blood vessel that carries blood with low pressure and oxygen concentration. [01mark]

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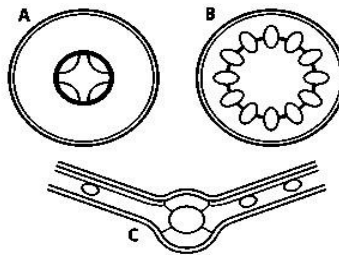
- c) How is pressure and composition of blood in blood vessels 3 and 4 differ? [02marks]

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### Item 63

The diagrams show transverse sections of **A** root, **B** stem and **C** leaf.



- a) On the diagrams, shade the areas that represent the position of xylem and phloem in A, B and C. [03marks]

- b) Complete the table below to compare the functions of xylem and phloem. The term *sap* refers to the liquid transported in these two tissues. [03marks]

Feature	Phloem	Xylem
Composition of sap		
Direction of flow in the stem		
Destination		

- c) Describe how you would discover the pathway taken by water as it travels through the parts of the plant that are above the group. [03marks]

#### Item 64

Three groups of seedlings were grown in solutions that were deficient in two ions that plants need. Group **P** was grown without nitrate ions. Group **Q** was grown without magnesium ions. Group **R** received all the ions that plants require. The results are shown in the table.

Group of seedlings	Colour of leaves	Growth
P	Yellow (especially the lower leaves)	Reduced growth but not as much as seedlings in group Q
Q	Lower leaves -yellow. Upper leaves - pale green.	Severely reduced growth
R	Green	Normal growth

- a) Explain the effect of the deficiencies of nitrate ions and magnesium ions as shown in the table. [03marks]

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- b) Why was it necessary to include the seedling in group R? [01mark]

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- c) Many crops throughout the world are grown in glasshouses. Explain how conditions are controlled in glasshouses to achieve high yields. [04marks]

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### Item 65

Cassava plant, *Manihot esculenta* produces root tuber which is the major source of fibre and carbohydrates in many families in Uganda due to the less requirements it requires to grow, its high productivity and tolerance to dry conditions. During a research study in some village, it was noted that the major cause of low cassava productivity is infection with a viral disease, Cassava mosaic which cause twisting of leaflets reducing leaf area exposed to light and amount of food manufactured by the plant.



a) State the (03marks)

i) Kingdom.....

ii) Class.....

iii) Genus .....

iv) Species of the cassava plant.....

b) Describe how cassava mosaic is spread and the ways farmers in your community are preventing its spread and effects. (07marks)

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**Item 66**

Insects are diverse and play several vital roles in the life of other organisms. They share several structural features on their bodies some of which have made them to be the most successful organisms on Planet Earth.



- a) State three similarities between the above three insects. (03marks)

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- b) Describe any two vital roles insects play in lives of other organisms. (04marks)

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- c) Using observable features on the insects above construct a dichotomous key to identify the above insects. (04marks)

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## SECTION B

### Item 67

In preparation for an inter-house competition, Shakira, a 40kg female athlete ate a meal containing 470g of carbohydrates in the morning, she believes the meal will help her perform better during the competition. However, her young brother does not seem to understand how the meal will contribute to Shakira's success. Shakira finally won the competition but experienced muscle cramps. She rested for 20minutes, returned home walking but the brother wondered how she still had the strength to walk home after the competition.

[The recommended daily carbohydrate intake for a 40kg female athlete is (280-480g)].

### SUPPORT MATERIAL



### Task

Explain to Shakira's brother the processes that the meal she ate went through to enable her win the race, be able to come back home and how her body regained the normal state. (20 marks)

**Item 68**

Helmond, a Belgian scientist, long ago keenly observed the behavior of plants. One day, using clay pots filled with 10kg of dried soil, Helmond was able to grow things. The pot was moistened with rainwater before some tomato seeds were planted. Tomatoes love heat. The tomatoes did not really start to grow until both the soil and air temperatures were consistently warm. The plants received rain until harvest. The mass of the seeds was 800gm. Four months after planting, the plant fruited. When dried, the harvested material had a mass of 12kg; while the dust in the in the clay pot, which had remained closed, was found to weigh 9kg. Therefore, the tomato stem, leaves, fruits and flowers had come from water only. The scientist this very important.

Support material

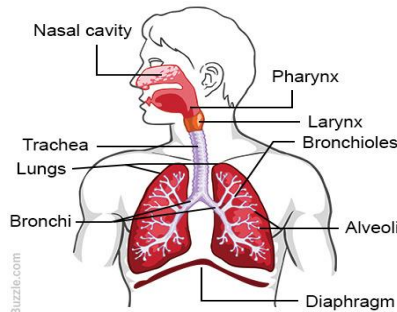
**Task**

As a biologist who is interacting with learners, you must understand what was wonderful. Write a speech on how plants increase in size to produce leaves, stems and fruits. (10scores)

**Item 69**

Zuria was wondering how we can be able to survive without dying. She was advised by Helen that we carry out gaseous exchange through breathing in oxygen and passing out carbon dioxide. She further asked how we eliminate carbon dioxide from our body and how that carbon dioxide accumulate in the body. (10scores)

Support material



### **TASK**

- a) Briefly explain to Zuria how carbon dioxide gas is eliminated from the body. (7 scores)
- b). Distinguish between excretory waste products and nitrogenous wastes giving examples in each case. (3 scores)

### **Item 70**

A village family lacked a dustbin for the previous years and dumped wastes in the garden. After some years their land became less productive and the family had severe poor yields. This year, one of the family children reached secondary school and learnt that plastics and metals in rubbish are not decomposed by organisms and tend to reduce soil aeration causing death of soil organisms resulting in to soil infertility. On returning home, he decided to dig a rubbish pit and later their harvests increased. The child was appreciated and was asked other things they study.

She only said "Thanks to biology". Explain what the child meant? (20 scores)

### **Item 71**

John passed PLE and his parents took him to secondary school. He asked his parents about what he is going to study in secondary School and was promised to study interesting subjects like biology which deals with the study of life. John wondered which life biology teaches about and whether there is anyone any other life other than his life. As a senior one student write a letter to John explaining to him what biology is and inform him about other forms of life besides him.

(20 scores)

### **Item 72**

A farmer who has been growing maize for the last 10 years has was encountering problems from domestic animals such as goats and cows which would eat the leaves of his maize plants lowering his harvests. In the past season, he decided to

construct a well roofed room without any window, in which he planted his maize, to curb the above animals. The maize germinated however after a month the leaves started yellowing and eventually the plants withered. He visited an agriculturist to explain to him about what happened. The agriculturist told him what plants go through as they mature and what they needed to use during their lifetime. Explain to this farmer which processes that the plants went through and why they withered  
(20 marks)

### Item 73

A village was attacked by a strange disease which killed cattle of residents. Rut's father lost over 100 cows, Rut was sad but decided to become a doctor of animals in future. Being in primary, Rut did not know what she needed to become an animal's doctor and she decided to inquire from her teacher. She was told to offer biology in secondary. When Rut went home she researched about biology and found it dealing with all living things. She was disappointed because she knew she could not become an expert in all living things rather to animals only. Write a letter to Rut explaining to her the diversity and specificity in biology and also inform her what part of biology she needs to study to fulfill her dream.  
(20 scores)

### Item 74

At the end of 2022, Uganda reported that hepatitis had killed 1250 people, Ebola-1590 and 5200 due to AIDS. The report explained the cause of each disease and its effect on different human body organs and systems. Extremely high infection rates of cassava crops by leaf mosaic disease was also reported. For each disease, Ugandans were sensitized on symptoms and mode of transmission but did not include prevention measures. Write the key information on each disease based on the report and suggest possible measures of prevention. (20 scores)

### Item 75

In the body, different processes need energy to run smoothly, these directly or indirectly require oxygen. As different organisms take up gases easily from the environment through their body surfaces, man is unique that has developed a respiratory system. This system has enabled human beings to take in air from the environment and with its subsequent carriage to body cells.

- a) Explain why man developed the respiratory system. (05 scores)



- b) State how gases can be carried to body cells from the environment.  
(15 scores)

### Item 76

Some slum areas have children that look weak, pale and were quite inactive as shown below. They rarely play or run around like other children of their age because on addition to lack of energy, some of the children have crippled bodies and so big. The school through the biology teacher and school doctor, intend to organize a medical camp for the slum children. The medical camp is aimed at discussing the cause of the above cases in children, the likely effects in case the challenges were not addressed and possible solutions to the above cases in children. The school is to purchase some food materials for the children as well. The biology teacher approaches you to prepare a speech to the slum children.



- a) As an S.3 student, use the knowledge of <sup>nutrient</sup> compound advice the school on what they should purchase for the children.

(10 scores)

- b) Write a speech that shall help the slum children to restore their normal life.  
(10 scores)

### Item 77

Two students of S.3 were touring their school banana plantation with much weeds. Each of them uprooted these plants and argued as to whether they are either monocots or dicots.



Banana plant



A weed

a) As a friend to both, how would you help them settle their argument?

**(07 scores)**

b) Explain to them how the different plant organs on both plants are modified to carry out the different functions. **(13 scores)**

### **Item 78**

Majje went to super classic hotel in Kavudo Sub County. He was given black tea with much sugar and eggs for breakfast because the other food types were over. After eating, he carried some tea in his bottle and a piece of egg to one of the school's laboratory to investigate the food samples in the tea and eggs. After reaching the lab, he organized the following laboratory reagents and apparatus.

**Iodine solution, retort stand , test tubes, measuring cylinder, filter funnel, filter paper, test tube rack, labels, droppers, Benedicts solution, hot water bath labels, test tube holder, distilled water, pestle and mortar**

Using the apparatus and reagents provided, design and carry out an experiment to investigate whether each of the food samples contains starch, reducing sugars, proteins or not. (25marks).

Your experiment planning should include the following aspects:

- i. **Title of experiment.**
- ii. **Aim of experiment.**
- iii. **Hypothesis.**
- iv. **Variables**
- v. **List of apparatus and materials used**
- vi. **Procedure**
- vii. **Presentation of data.**
- viii. **Conclusion.**
- ix. **Explanation of your hypothesis**

**Item 79**

Suzan a wife to James had a caesarean birth in which the baby is delivered through a cut made in the mother's abdomen and the uterus. During the course of the delivery, the surgeon who worked on her made a mistake and tempered with her ileum and the stomach which led to her death (May her soul rest in peace). As a nutritionist, explain the death of Suzan to her relatives who wanted to kill James that he caused the death of their daughter. (Score 15)

**Item 80**

In small village in Logiri, many farmers are complaining as to why their plants are not doing well despite the fact that their soils are very fertile and had weeded their plants regularly. You have been asked to explain to these people what could have happened and what can be done. Guide the farmers on this matter. (Score 15)

**Item 81**

The village health team (VHT) of your village are conducting a study in which they checked on the health status of each and every member including the children. One of the activities carried out includes recording the ages and heights of the members. They also have with them a chart as seen below.

BMI	Weight status
Below 18.5	Underweight
18.5-24.9	Normal weight
25.0-29.9	Overweight
30.0-34.9	Obesity class I
35.0-39.9	Obesity class II
Above 40	Obesity class III

The samples of results in one of the families is shown in the table below.

S/N	NAME	AGE(YEARS)	HEIGHT(cm)	WEIGHT(Kgs)
1	JOHN	17	125	50
2	MARY	30	160	78
3	CATHY	25	165	66
4	MARK	50	155	70
5	OKAFOR	40	150	70



Explain the significance of this activity to the locals and illustrate to them their health status using the results above. *(Score 15)*

### **Item 82**

Your village has been attacked by a rare species of caterpillars and a swarm of locusts that are eating your crops and plants in the field. This has drawn the attention of the locals who are much worried about their future saying that they may face food scarcity in some months to come. Guide the locals on what can be done to eradicate this catastrophe. *(Score 15)*

### **Item 83**

Uganda dentists' association conducted a survey about the oral hygiene of pupils in primary schools in Uganda from March to May 2023. In their studies, they found out that most of the pupils in classes from P.1 to P.4 had poor oral health characterized by the pupils having bleeding gums, tooth ache, dental decay and formation of pus around the base of their teeth as well as bad smells of their mouth. As such the head teacher of your former school has organized a one-day health talk for the school and one of the items on the programme list is maintaining good oral hygiene. Guide the pupils on what can be done to improve their oral hygiene. *(Score 15)*

### **Item 84**

Otim, an S.2 student ate a meal consisting of an egg, cooked cassava and ground nuts during his breakfast. After eating his breakfast, Otim went back to class for his mid-morning lessons. As a student who has acquired knowledge about how animals obtain their food, ingest it, digest it and final products of digestion absorbed; help Otim understand how the meal he ate was broken down in the body until when the final products of digestion were absorbed. (15 marks)

### **Item 85**

Plants in our environment have green structures that they use for carrying out photosynthesis.

- a) How would you explain to your sister in S.1 that plants are adapted for carrying out photosynthesis? (08 marks)

- b) Explain how plants and animals depend on each other in nature. (04 marks)
- c) In your opinion, what do you think are the direct and indirect ways in which people benefit from plants? (02 marks)

### Item 86

Crop growing is one of the major activities practiced by people living along the shores of L. Victoria. During heavy rains, a lot of water flows from the main land into the Lake and some remain logged in environment where people live. During this time, most people are reported with malaria, crops give low yields than expected.

Farmers in Kigezi highlands also face the same challenge of low yields during same season.

#### Task.

Explain the causes leading to challenges in these areas and suggest possible solutions to overcome them. **(15 scores)**

### Item 87

Moses planted and mixed maize and bean crops on his plot along an extremely dusty road side. As a way of obtaining good yields, prepared his garden well, planted quality seeds in closely packed columns and rows, applied fertilizers, Sprayed to prevent any pests and removed weeds. He planted maize earlier and planted beans later after maize plants were already tall. His maize yielded poorly and beans remained stunted with no yields. He is nervous about the outcomes yet spent lot of money on the garden.

#### Task

Help Moses understand the cause of the outcomes and advise how he can plant the same plants in the same garden in other seasons with minimal losses.

**(15 scores)**

### Item 88

A 7 year old boy, developed the following symptoms: fluid retention and swollen distended abdomen, weak bones, low body weight, weak immune system and brown hair. Parents believe that his health condition is due to lack of appetite food. The doctor advised them to change child's diet, however they are confused on how to manage the diet of the child.

#### Task:

Explain to the parents the cause of their boy's health status and advise them on how suitable diet would improve the for the boys' health. **(15 scores)**

**Item 89**

Hormones are chemical messengers which send information to particular organs in the body in order to bring about corrective responses which enable an organism to survive. Imbalanced Production of hormones leads to particular disorders. Describe the causes and symptoms of any two common hormonal disorders in your community. (10marks)

(b)How can the above disorders be prevented and treated. (05marks)

**Item 90**

a) Kidneys filter blood, separate useful materials from excretory wastes and control water content. Outline how the kidney tubule produce urine from the substances in blood plasma. (08 marks)

b) One of the treatments of kidney failure is connecting a patient to a dialysis machine. Describe the operation of dialysis machine. (07marks)

**Item 91**

Farmers in kasoozo village have had low yields in the recent season and the government specialist has reported that this has been due to reduced soil fertility. As a student of biology in s.3, suggest and describe the steps farmers and gardeners in this village can take to improve and maintain soil fertility for better yields. (15 marks)

**Item 92**

John Mary has a very anaemic child admitted in Mulago hospital, the doctors have advised that blood transfusion should be done within the next 3 days to save this child. The child's blood group has been established as A. the hospital has run short of blood in the blood bank so the advice was to get blood from any of the family members, John Mary has 4 mature children who are all ready to donate blood to save their young sibling, Allan has blood group O, Okello is blood group B, Ruth has blood group A and is HIV positive and Clare has blood group AB.

## Blood group compatibility table

		Donor							
		O-	O+	A-	A+	B-	B+	AB-	AB+
Recipient	O-	✓	✗	✗	✗	✗	✗	✗	✗
	O+	✓	✓	✗	✗	✗	✗	✗	✗
	A-	✓	✗	✓	✗	✗	✗	✗	✗
	A+	✓	✓	✓	✓	✗	✗	✗	✗
	B-	✓	✗	✗	✗	✓	✗	✗	✗
	B+	✓	✓	✗	✗	✓	✓	✗	✗
	AB-	✓	✗	✓	✗	✓	✗	✓	✗
	AB+	✓	✓	✓	✓	✓	✓	✓	✓

You are John's friend and has told you about all this, make a write up with clear illustrations to help John to transport the rightful child to donate blood so that he can save transport and the life of the child. Give reasons for your choice of child and ignoring other children.

### Item 93

Three farmers have gardens growing maize in the same area. As part of your study, you visited the gardens of each farmer and made the following observations a shown in the table below.

Farmer	Colour of maize leaves	Maize intercropped with groundnuts	Cocks and hens are in the maize garden	Maize yield
A	Green	Yes	Yes	High
B	Yellow	No	No	Low
C	Green	yes	Yes	Average

As a learner with knowledge of biology write an essay explaining the crop yield of the three farmers.

**Item 94**

Days before the interhouse football competitions are held, participants are always encouraged to eat a balanced diet and to do regular exercises. For this year's interhouse competitions, one student who had been awarded as the best player refused to feed on a balanced diet and to do regular exercises claiming that he was fit enough for the competition. During the football match, he collapsed towards the end of the first half. This player had a sudden muscle pull and was breathing in and out heavily. Many members of the house could not understand why their best player had collapsed.



Write a presentation you would deliver to the members of the house explaining the cause of the problem.

**Item 95**

Moses planted and mixed maize and bean crops on his plot along an extremely dusty road side. As a way of obtaining good yields, prepared his garden well, planted quality seeds in closely packed columns and rows, applied fertilizers, Sprayed to prevent any pests and removed weeds. He planted maize earlier and planted beans later after maize plants were already tall. His maize yielded poorly and beans remained stunted with no yields. He is nervous about the outcomes yet spent lot of money on the garden.

**Task.**

Help Moses understand the cause of the outcomes and advise how he can plant the same plants in the same garden in other seasons with minimal losses. **(10 scores)**

**Item 96**

A 7 year old boy, developed the following symptoms: fluid retention and swollen distended abdomen, weak bones, low body weight, weak immune system and brown hair. Parents believe that his health condition is due to lack of appetite food. The doctor advised them to change child's diet, however they are confused on how to manage the diet of the child.

**Task:**

Explain to the parents the cause of their boy's health status and advise them on how suitable diet would improve the for the boys' health. **(10 scores)**

**Item 97**

In the district athletics competitions held at St. Charles Lwanga SS playground, it was observed that the athletes took glucoses especially after heavy races. It was also evidenced that the athletes sweated while running and their shirts had unpleasant smell at the end of the day. In addition the athletes breathed at a higher rate after every race. Linda a senior one student picked much interest in understanding the scientific idea behind the observations above, however due to limited knowledge she could not fully understand the idea.

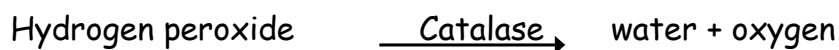
**Task.** How would you help Linda to clearly understand the scientific idea behind the observations made? **(10 scores)**

**Item 98**

Some senior two students had an argument whereby some students were of a view that germinating seeds produce heat while others were of a view that they absorb heat. For that reason, they decided to carry out an experiment to discover the truth. However they were worried of how to conduct the experiment. How would you help the learners be able to execute their experiment successfully? **(10 scores)**

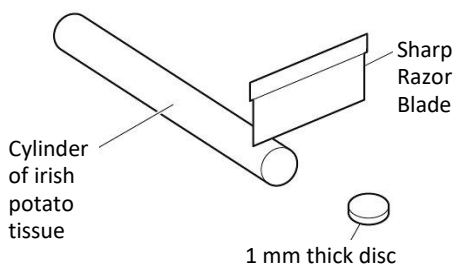
**Item 99**

Catalase is an enzyme found in most living organisms. It catalyzes the breakdown of hydrogen peroxide to water and oxygen.



Potato tissue contains catalase. When a thin disc of potato is dropped into a test-tube containing hydrogen peroxide solution, it first sinks to the bottom. As oxygen

is produced, bubbles form on the potato disc that make it float to the surface. Some students did an experiment to find the activity of potato catalase on different concentrations of hydrogen peroxide solution. 1 mm thick discs were cut from the end of a cylinder of potato tissue as shown in the diagram below.



One disc was dropped into a test-tube containing 15 cm of 1% hydrogen peroxide solution. A stop-watch was started immediately and the time taken for the disc to reach the surface of the solution was recorded. The time was rounded to the nearest whole second.

A second disc was then dropped into the test-tube and the time taken for it to reach the surface recorded.

This process was repeated with a third disc. The experiment was then repeated with a test-tube containing 15 cm<sup>3</sup> of 2% hydrogen peroxide solution.

The results are shown in the table below. The procedure was repeated with a test-tube containing 15 cm of 3% hydrogen peroxide solution. The times recorded were 8.3, 6.9 and 9.1 seconds.

Percentage concentration of hydrogen peroxide solution	Time taken for potato disc to reach surface of hydrogen peroxide solution in seconds			
	disc 1	disc 2	disc 3	Mean
1	30	26	34	
2	12	14	13	
3	32	28	37	



- (a) (i) Complete the table by entering the results for 3% hydrogen peroxide solution (*rounded to the nearest whole second*) and calculating the means. Hydrogen peroxide is a harmful or irritating substance. (3 marks)
- (ii) State two precautions you would take when using hydrogen peroxide in an experiment. (2 marks)
- (iii) State what equipment the students could use to measure 15 cm of hydrogen peroxide solution. (1 marks)
- (iv) Describe the effect of increasing the concentration of hydrogen peroxide solution on the time taken for the potato discs to float. (10 marks)
- iv) Explain what the students could do to make their results more reliable. (5 marks)
- (vi) Suggest one possible source of error in the method used in this experiment. Explain why this could have affected the results. (2 marks)

### Item 100

In the district athletics competitions held at St. Charles Lwanga SS playground, it was observed that the athletes took glucoses especially after heavy races. It was also evidenced that the athletes sweated while running and their shirts had unpleasant smell at the end of the day. In addition the athletes breathed at a higher rate after every race. Linda a senior one student picked much interest in understanding the scientific idea behind the observations above, however due to limited knowledge she could not fully understand the idea.

- (a). How would you help Linda to clearly understand the scientific idea behind the observations made. (10 scores)

### Item 101

Some senior two students had an argument whereby some students were of a view that germinating seeds produce heat while others were of a view that they absorb heat. For that reason, they decided to carry out an experiment to discover the truth. However they were worried of how to conduct the experiment. How would you help the learners be able to execute their experiment successfully? (15 scores)



**Item 102**

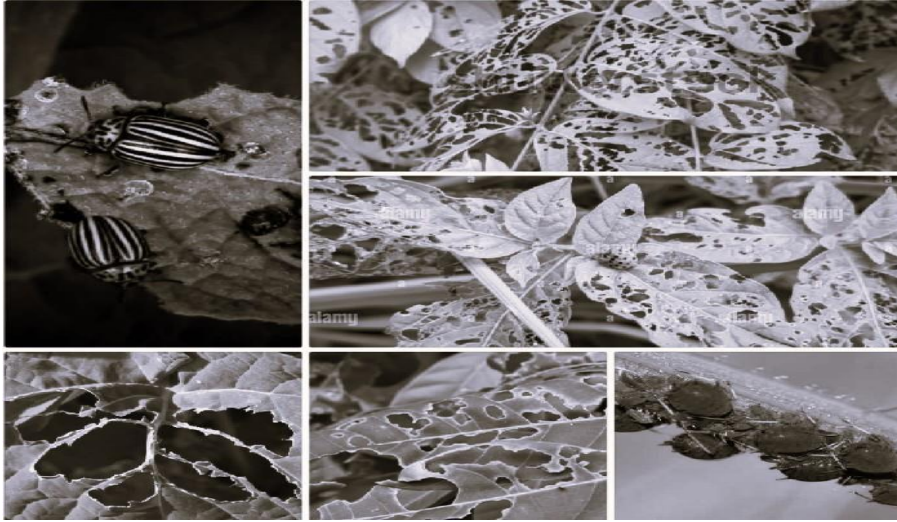
Mr. Musenero (50 years old) neglected his teeth, they decayed and gradually plucked out one by one. He would no longer eat different types of foods as before. He now started depending on only porridge as food for a longer time. He later developed several body complications and was rushed to hospital.

**Task.**

As a S.2 graduate biology student with diverse knowledge in nutrition, you are invited by the village members to give a guidance about the cause of Mr. musenero's complications to prevent its re-occurrence. **(15 marks)**

**Item 103**

Certain strange flying organisms have attacked plantations in western Uganda and they eat all the leaves from plants. The organisms have three main body parts, six legs and three thoracic segments. Farmers in the area have requested the government to spray the area using a pesticide and kill all these strange organisms.



### Task

You are the agricultural officer invited to help the farmers identify these organisms and advise them accordingly, write a presentation you would give.

(15 marks)

### Item 104

A farmer grew banana on some piece of land and yields were very poor. He consulted a soil scientist who told him that the banana plants would give higher yields on loam type of soil. He then decided to buy another piece of land. He had three choices of plots of land where he had to pick only one. He hired a soil scientist who carried out an experiment on the three plots of land as below.

#### *Experiment.*

The soil scientist obtained  $100\text{cm}^3$  of soil samples from each of the plots **A**, **B** and **C** and put them in separate measuring cylinders. He then added  $100\text{cm}^3$  of water to each soil sample, stirred and allowed them to settle for some time. The volume of the content in each measuring cylinder was then taken and recorded as shown in table below.

Soil sample	volume of the mixture in each measuring cylinder/ $\text{cm}^3$
Plot A	175.0

Plot B	185.0
Plot C	150.0

**Task.**

Using the information provided by the soil scientist, guide the farmer on the choice of land to buy. (15 marks)

**Item 105**

Plants in our environment have green structures that they use for carrying out photosynthesis.

- How would you explain to your sister in S.1 that plants are adapted for carrying out photosynthesis? (08 marks)
- Explain how plants and animals depend on each other in nature. (04 marks)
- In your opinion, what do you think are the direct and indirect ways in which people benefit from plants? (02 marks)

For plants to be successful on Earth, some plants had their roots, leaves and stems modified to serve different plants a number of functions. Every year, an agricultural show is organized in Jinja to show people how plants can be grown effectively to sustain human life.

**Task**

Prepare a speech you will deliver to the people who will attend to the show explain to them how the above parts are modified to perform different functions in plants. Also explain how some of the above parts of the plant are vital in the propagation of the plant. (10scores)

**Item 106**

Mr. Andrew has 2 groups of plants at his home: one is potted from outside the house at the veranda, and another is potted from inside the house near the window. One day, Andrew went for burial in the village. Before he left the home, Andrew watered both plants which he waters after every 4 days, shut the house and also covered the potted plant at the veranda as shown below to prevent domestic

animals from browsing on the plant. On coming back after 2 days, Andrew found his plants withered and thought that the plants had run short of water.



House window plant



Veranda plant

**Task**

Explain to Andrew that his assumption is not correct and inform him about what caused the withering of the plants. Advise Andrew on he can restore the health of his plants. (10scores)

**Item 107**

Suzan was given money in the money to buy vegetables for supper. She purchased the vegetables in the morning from the vendor and placed them in the house. On returning from school after lunch, she found the vegetables shrank in size and she was scared to accused for using some money for personal issues.

**Task**

As an S.2 student, explain to Suzan what happened to the vegetables and on how she would restore the size of the vegetables. (10scores)

**Item 108**

In many of the healthy workshops about our diets, facilitators and healthy workers emphasize the consumption of the following food substances on a regular basis and as supplements on the diet, as well as discouraging us from consumption of some substances including half cooked meat. A group of these food materials.



### **Task**

Explain using any food substance shown above together with half cooked meat do facilitators discourage us from eating by stating the possible effects of these food and how foods represented above basing on the nature of their digestive properties important as dietary supplements on our daily meals. (10scores)

### **Item 109**

Martha is a medium sized girl who was employed in a certain medical facility. One day at work, Martha accidentally had a chemical substance that caused her to start emaciating, even when she ate food and she started experiencing effects that she did not have before.

When she became very thin, Martha stopped moving to work due to fear of being undermined. In the room, Martha was worried about what happened to her and always wished to recover her normal size and weight.

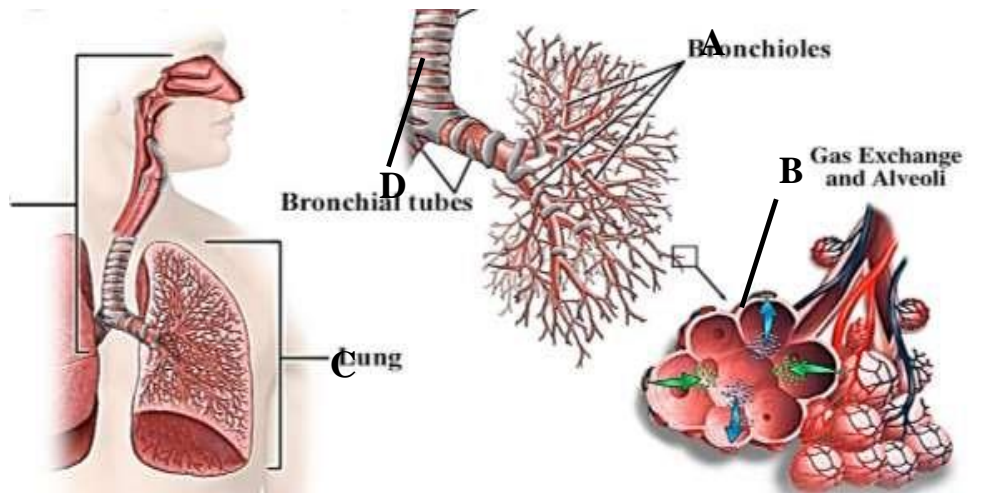
### **Task**

As an S.2 student, write a letter to explain to Martha what happened to her body and how she can recover the normal size. Advise Martha on whether she can move to work or not due to this situation. (10scores)

### **Item 110**

A human respiratory system is one of the sophisticated system in the body in relation to its structures and the mechanisms of action. The system has various structures that enable it perform its function.



**Task**

Write down using the words labelled on structures in the diagram, the function and adaptations of this system to its function.

(10scores)

**Item 111**

Umar is a moslem who during the Ramadhan period has Futar (evening break of fasting) and eventually feels sleepy after this meal but then gains energy to go for winter classes when very sober. However, at the end of Ramadhan Umar had reduced in size though he tested to be in normal health.

**Task**

Explain the contents of this statement.

(10scores)

**Item 112**

During a research conducted by microbiologists, a conclusion was made that many microorganisms are responsible for the increasing both human infections and plant diseases, of which bacteria was a major concern in their study. During the study, they grouped the bacteria, basing on both dependence of oxygen for survival and shapes of the bacteria. In their conclusion also, they clarified how bacteria are important to farmers.

**Task**

Write an article about the shape and size of bacteria. In the article, explain how the anaerobic nature of bacteria is significance to the farmer and his cattle

(10scores)

**Item 113**

In an experiment, two glass tubes were filled with different soil samples A and B. The glass tubes were placed in a basin of water and left to stand for 5 days. The rise of water column in each soil sample was measured and recorded each day for 5 days as shown in the table below.

Days	Rise of water column in cm	
	Soil sample A	Soil sample B
1	12	20
2	16	24
3	32	26
4	37	27
5	38	27

**Task**

Use a graph to explain the properties and role of each soil sample.  
(10scores)

**Item 114**

Algal blooms occur on the surface of water bodies. However, the result occurs that underwater plants die and the subsequent death of aquatic fishes. On addition to that, the chemical substances that are used to kill water hyacinths that are water weeds is normally found distributed in mammals including man.

**Task**

How do these statements explain the plants to be the most producers on Earth?  
(10scores)

**Item 115**

Recently, the government of Uganda removed to grant city status to all regional towns. Municipal engineers were tasked to produce a comprehensive report that includes information on greening levels of these towns. During fact-finding meetings with town residents, people complained that some of their houses had cracked because of town trees. For some homes, perimeter walls and the plumbing pipes had similar damages. Some roads had also cracked. Meanwhile, none of the concrete structures near a certain category of trees was affected.

**Task**

Apply your knowledge of growth as you write a letter to the municipal engineer explaining how cracking, breaking and damaging of property by some trees might have come about. In the letter, suggest the safer trees for greening the cities and why. (10scores)

**Item 116**

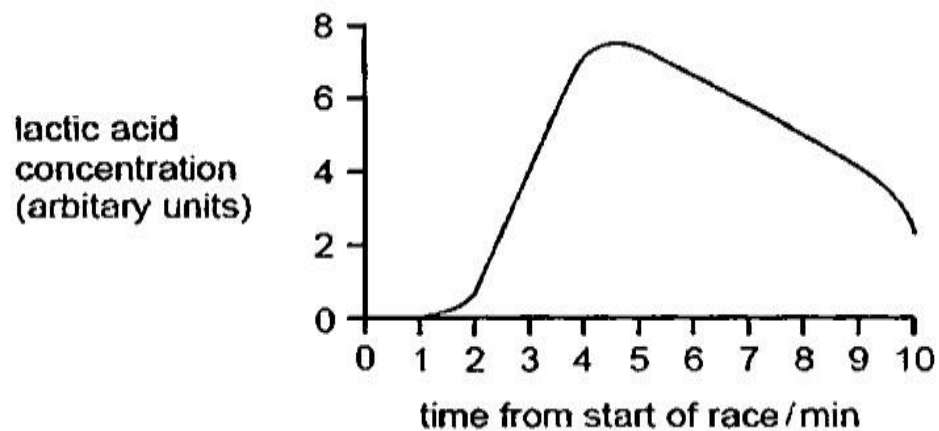
Bryophytes lack vascular tissue but obtain materials from their habitat. Alveoli, gill filaments and villi have thin walls and numerous in lungs, fish gills and ileum respectively. Babies feel cold so much than their mothers. Rats consume more food than large mammals.

**Task**

Explain the relevance of each statement. (10scores)

**Item 117**

Days before inter-class athletics competitions race held especially the long-distance races, participants are always encouraged to eat sweet potatoes or white rice, chicken, avocado and vegetable. During the cross-country race on sports day in your school, one of the best athletes collapsed towards the end of the race. The runner had a sudden muscle pull and was breathing in and out very heavily. Many of the members of the class could not understand why the runner collapsed.

**Task**

Guide learners to prepare a written presentation they would deliver to the class explaining the scenario. They may find the image useful. (10scores)



**Item 118**

The head of guidance and counselling department in your school noted the increasing number of students asking awkward questions about the strange changes in their bodies. The nurse also reported that some students were faking sickness to stay out of classes because of the humiliating changes they deal with, leading to low self-esteem and embarrassment. Most students complain of strange bodily fluids, stinky smell, restless mood, hair growing in unexpected places, emotional disturbances, whole body pimples, sore breasts that also vary in size, wetting of underwear and beds, among others. In the latest meeting, the school counselling team resolved to organize counseling sessions for every class. **Task** Prepare a speech for the school counselling team, to address the students' concerns. (10scores)

**Item 119**

In one of the schools in the village, the septic tank filled up with many materials including human wastes, plastic materials, pampers and tissue papers that learners deposit in it. The school intends to dispose off the wastes and empty the tank, but lacks idea on how these materials can be handled in a way that is environmental friendly. **Task**

Explain to the school, what can be done to ensure that the materials are properly managed during the emptying of the septic tank by explaining the significance of proper disposal of materials in the environment. (10scores)

**Item 120**

For many years, Uganda uses the campaign slogan "ABSTAIN FROM SEX". This slogan targets young people.

However, records show that several teenagers continue to engage in sexual activities and don't seem to understand the meaning of the campaign. **Task**

You have been asked by the chairperson of the teen's club to talk to the club members about abstinence from sex. (10scores)

**Item 121**

A school grows maize in their garden. One day the biology teacher told the learners to go and collect flowers. The learners went to the garden and removed all the

inflorescences from the maize plant. That season the school did not get any harvest.

### **Task**

Write a report to the head teacher to explain they did not get any yields. (10scores)

### **Item 122**

Maka's mother was diagnosed of cervical cancer and then cannulated in the vein of the left arm. She left the hospital when also given painkiller tablets of headache to be taken orally. On her coming back home, she asks Maka as how the cannula and tablets shall work and she heals. As an S.2 student, help Maka on how he will explain to her mum. [10marks]

### **Item 123**

At NEC secondary school, it is a cultural belief that when a girl has sexual intercourse during her menstrual periods, she is likely to get pregnant, many girls avoid having sex during their periods but still there is an incidence of unwanted pregnancies in the community. As a student of biology, write a presentation to members of the community to explain to their girls the changes which occur in their bodied and how they can avoid these unwanted pregnancies. [10marks]

### **Item 124**

Okello is a renowned farmer in Buikwe. He was practiced farming in this area for a number of years. His farm has a variety of crops which he sells in a number of markets in his area to earn a living with his family. However, this season due to the heavy rainfall, much of the fertile soils on his farm have been washed away to the low-lying areas since his farm is located on a steep slope thus leaving the soil bare and infertile. This has also affected the various components of soil which existed in the soil before thus making the soil lost its fertility. Due to this, his crop yields have also reduced this season as compared to the previous season. He is now frustrated about what to do season since he is completely dependent on agriculture as his only source of income. [10marks]

### **Item 125**

For plants to be successful on Earth, some plants had their roots, leaves and stems modified to serve different plants a number of functions. Every year, an agricultural show is organized in Jinja to show people how plants can be grown

effectively to sustain human life. Prepare a speech you will deliver to the people who will attend to the show explain to them how the above parts are modified to perform different functions in plants. Also explain how some of the above parts of the plant are vital in the propagation of the plant. [10marks]

### **Item 126**

At the end of 2022, Uganda reported that hepatitis had killed 1250 people, Ebola-1590 and 5200 due to AIDS. The report explained the cause of each disease and its effect on different human body organs and systems. Extremely high infection rates of cassava crops by leaf mosaic disease was also reported. For each disease, Ugandans were sensitized on symptoms and mode of transmission but did not include prevention measures. Write the key information on each disease based on the report and suggest possible measures of prevention. [10marks]

### **Item 130**

There was an argument between learners about breathing in man, fish and plants. Some learners were saying that all breathe while others were saying that fish and plants do not breathe and that cannot be affected by pollution. You were called to give your opinion. As a biology learner, write an essay to help the learners. [10marks]

### **Item 131**

Plants provide one of the most diverse environments for organisms on earth. Unfortunately, they are facing threats due to various factors, causing their populations to reduce at an alarming rate. As a result, the delicate balance of the environment is disturbed, posing a significant challenge to variety of living organisms dependent on the plants and the sustainability of natural resources.

#### **Task.**

Explain how possible threat factors to organisms in scenario affect long-term survival of variety of living organisms and the natural resources and provide solutions to ensure environmental stability. (15 scores)

### **Item 132.**

Moses planted and mixed maize and bean crops on his plot along an extremely dusty road side. As a way of obtaining good yields, prepared his garden well, planted quality seeds in closely packed columns and rows, applied fertilizers, Sprayed to prevent any pests and removed weeds. He planted maize earlier and planted beans

later after maize plants were already tall. His maize yielded poorly and beans remained stunted with no yields. He is nervous about the outcomes yet spent lot of money on the garden.

**Task.**

Help Moses understand the cause of the outcomes and advise how he can plant the same plants in the same garden in other seasons with minimal losses.

(15 scores)

**Item 133**

A 48 year old patient presents the following symptoms- swollen feet and general body weakness (tiredness/fatigue).

Doctors recommended the patient to have a simple meal which included bread, piece of egg and water. After three hours resting, blood and urine samples were obtained and test on his urine sample made. The test results on concentration of different substances in blood, and urine are presented in table below.

Substance	Concentration of blood plasma (g/dm <sup>3</sup> )	Concentration of urine of normal person (g/dm <sup>3</sup> )	Concentration of patient's* urine sample (g/dm <sup>3</sup> )
Glucose	1	0	0.9
Urea	0.3	300	50
Plasma proteins	80	0	40

**Task.**

Explain why resting was necessary and analyze the patient's results to provide possible solutions on how the condition can be managed. (15 scores)

**Item 134.**

A 60 year old woman has a neck lump (swelling), frequent back pain and poor vision. Doctors further revealed that she has porous bones in her back bone and Age-related long-sightedness. Her family members may manage her condition through diet. The family people lack correct plan and nature of diet to administer.

**Task.**

Explain cause for the old woman's health condition, suggest how a suitable diet and sight defect correction would manage her condition. (You may include sight defect correction diagrams in your response). (15 scores)

**Item 135**

After birth, the baby emerged as an albino yet the two parents have normal skin color. The family relatives to the man have rejected the baby claiming she could have conceived from another man who is probably an albino. The family suspects so because the first born to the couple had normal skin color.

**Task**

Explain to the couple and entire family the possibility of having such a baby and accept the baby as part of family. (15 scores)

**Item 136.**

Queen Elizabeth National park has abundant wild life, including several plant species, kobs, Nile crocodiles, lions, hyenas and wild rabbits. People from neighbouring community illegally hunt kobs and wild rabbits for meat. This affects the stable interdependence among wild life and as a result, other deadly wild animals then attack human life and their domestic animals as escape from the park to neighboring community. Due to loss of human life and effect on tourism sector, government calls upon potential people to sensitize the community about the current situation.

**Task.**

Explain how various human activities affect the interdependence of the above organisms and sensitize the community on outcomes of their activities and likely possible benefits they avoid such activities.

**(15 scores)**

**Item 137.**

Moses planted and mixed maize and bean crops on his plot along an extremely dusty road side. As a way of obtaining good yields, prepared his garden well, planted quality seeds in closely packed columns and rows, applied fertilizers, Sprayed to prevent any pests and removed weeds. He planted maize earlier and planted beans later after maize plants were already tall. His maize yielded poorly and beans remained stunted with no yields. He is nervous about the outcomes yet spent lot of money on the garden.

**Task.**

Help Moses understand the cause of the outcomes and advise how he can plant the same plants in the same garden in other seasons with minimal losses.

(15 scores)

**Item 138**

A 48 year old patient presents the following symptoms- swollen feet and general body weakness (tiredness/fatigue).

Doctors recommended the patient to have a simple meal which included bread, piece of egg and water. After three hours resting, blood and urine samples were obtained and test on his urine sample made. The test results on concentration of different substances in blood, and urine are presented in table below.

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Glucose	1	0	0.9
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Plasma proteins	80	0	40

**Task.**

Explain why resting was necessary and analyze the patient's results to provide possible solutions on how the condition can be managed.

(15 scores)

**Item 139.**

A 60 year old woman has a neck lump (swelling), frequent back pain and poor vision. Doctors further revealed that she has porous bones in her back bone and Age-related long-sightedness. Her family members may manage her condition through diet. The family people lack correct plan and nature of diet to administer.

**Task.**

Explain cause for the old woman's health condition, suggest how a suitable diet and sight defect correction would manage her condition. (You may include sight defect correction diagrams in your response).

(15 scores)

**Item 140**

After birth, the baby emerged as an albino yet the two parents have normal skin color. The family relatives to the man have rejected the baby claiming she could

have conceived from another man who is probably an albino. The family suspects so because the first born to the couple had normal skin color.

**Task**

Explain to the couple and entire family the possibility of having such a baby and accept it as part of their family.

**(15 scores)**